

X. *Observations on the Duration of Life in the Honey Bee.* By J. G. DESBOROUGH.

[Read 4th May, 1868.]

The following observations on the Honey Bee are in continuation of the Prize Essay of the Entomological Society for the year 1852 (Trans. Ent. Soc., second series, vol. ii. p. 145); and of the Paper on the same subject read on the 2nd April, 1855 (*ib.*, vol. iii. p. 187).

In the last mentioned paper, I traced the existence of a queen bee from the month of July, 1852, to the end of the year 1854; and I now propose to give the result of my observations upon the queen, with which the hive was stocked, until her death, or rather, her disappearance.

The month of January, 1855, was frosty nearly throughout, with much snow, and the frost continued in the succeeding month up to the 25th, when a thaw set in; notwithstanding this severe weather, the queen commenced depositing eggs, and on the 19th February, I observed brood sealed over; on the 10th March, I saw a young bee perfect, and on that day there were 108 cells sealed over containing brood; the queen however did not again deposit eggs until April, one prevailing cause for which might possibly have been the continued cold season, but singularly enough, one drone cell was observed on the 1st April in the midst of worker cells, but the grub had died before being sealed over. The breeding from the 6th April, on which day the queen again deposited eggs, was carried on uninterruptedly until September. Pollen was first collected on the 6th April, and the spring was so unfavourable, that I was compelled to continue feeding throughout May and up to the 17th June, after which time honey was rapidly collected and stored.

Another single drone was reared in a worker cell, and although he was allowed to come to maturity, on the 11th July he was dragged out of the cell and killed.

The brood during this year, with the exception named above, was entirely worker brood, and although the queen, to all external appearance, was as healthy as ever, she did not produce in the aggregate one half the quantity of bees brought forth in the preceding year; this

might probably be owing to the severity of the season in the early spring and summer, but we shall have occasion further to allude to this subject towards the close of this paper.

The winter of 1855-1856 was again wet and cold, as well as frosty, and the great difficulty was to keep the bees free from damp, and as the combs were now getting dark and dirty, there was great tendency to mould; I managed, however, to get the hive through the winter with very little loss of life in the interior of the hive, compared with that of the preceding year. On the 30th January I saw brood sealed over, and a few drone cells also sealed over; but although the workers were allowed to hatch off at maturity, the drones were dragged out and destroyed, after being sealed over about three days. The breeding was not continued, nor was it resumed until April. In July, a small space, four inches by two, on each side of one comb, was occupied with drone brood, which was hatched off by the 11th August, and these drones were killed in the ordinary way about ten days afterwards.

The proceedings of the hive do not call for any special remark during this year.

We now come to the winter of 1856-1857, which commenced with a deep snow so early as Nov. 26th, and a frost lasting till December 5th, very severe; and on the breaking up of the frost, the hive was excessively damp, and apparently unhealthy, as I removed eighty dead bees; I contrived, however, to get the hive dry, and pursuing the same course of management as before, I brought them through the winter; brood was first detected on the 21st February, and only worker eggs were laid; the breeding was again delayed after the first batch until April, and continued until September; but during this year there was no appearance whatever of drone brood; still the queen looked healthy, and the hive continued in good condition; I had cut out as much of the old comb as was dirty, and had become mouldy; it had been renewed by the bees, and the hive was in as good a state to stand the winter as at any previous period. I had continued the daily observation of the queen up to the 22nd November, but after that day I could not detect her; I thought she might be concealed between the two centre combs, and I did not disturb the hive for a few days; but still not seeing her, on the 29th

I made a regular search, but the queen was not in the hive, and what had become of her I could not discover; the weather was fine and sunny, and whether she had been tempted to leave the hive and had become chilled, or whether she had been picked up by a bird, or what else was her end, it is not for me to record. I can only state the fact, that a queen bee will live for five years and upwards, namely, from July 1852 to November 1857; in fact, six summers or seasons. The actual duration of life in the queen bee still remains undetermined.

The period of five years and four months is, I believe, the longest recorded duration of life in the queen bee. Golding, in his "Shilling Bee Book" (1847), speaks of a queen bee with an imperfect wing existing in a hive from May 1828 to June 1832; but this recorded life exceeds his by a year and a quarter.

I annex a table of the number of bees produced in the hive during the summers of 1855, 1856, and 1857, making a total, with the numbers shown in the last paper, of 108,026 as the produce of one insect, and this of one kept in an artificial state. The numbers produced in a hive not so confined as the Observatory hive must be very great indeed, and the comparative numbers produced in each year bring us again to reconsider the duration of life in the queen bee.

Table showing the actual number of bees produced in the Observatory Hive during the years 1855, 1856, and 1857.

1855.		1856.		1857.	
Time of measuring Brood.	No.	Time of measuring Brood.	No.	Time of measuring Brood.	No.
February 19 . .	108	January 30 . .	40	February 28 . .	216
April 16 . .	162	April 13 . .	108	April 12 . .	81
May 6 . .	270	May 4 . .	729	May 3 . .	756
" 27 . .	668	" 25 . .	1,350	" 24 . .	864
June 17 . .	1,080	June 15 . .	2,916	June 14 . .	2,916
July 8 . .	3,240	July 6 . .	4,563	July 5 . .	3,483
" 29 . .	4,077	" 27 . .	6,480	" 26 . .	3,402
August 19 . .	4,347	August 17 . .	216	August 16 . .	2,214
September 8 . .	351			September 6 . .	1,296
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	14,303		16,402		15,228

The Grand Total of the six seasons was as below :—

1852	7,060
1853	23,701
1854	31,332
1855	14,303
1856	16,402
1857	15,228
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	108,026
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Looking at the number of eggs laid by the queen in the six seasons of her life, we find that she was most fertile during the second and third years of her existence ; and although it is proved that the queen *can* live over five years, yet it does not follow that, in a state of nature, she may be permitted to reign as the monarch of the hive during that time ; had the queen observed upon been in an ordinary hive which had been allowed to swarm, she would have changed her residence every time a swarm issued, and she would then have acted as the leader thereof ; but whether she would have succeeded in establishing herself at the head of five successive colonies is, I think, very doubtful.

Bee-keepers are well aware of the many times a swarm issues and returns, as is supposed, because they cannot find the queen ; may it not happen that the queen is incapable, from old age, of flying with the swarm to their place of setting, and so is lost ?

As to the probable ordinary duration of life in the queen when in a state of nature, I am much inclined to place the limit at three or four years, and to assert that the age of my queen, prolonged to five years and four months, was beyond the ordinary duration. I have, however, been extremely careful throughout both my Essay and the Papers in continuation, not to state any facts but those I have personally observed ; and other apiarians as well as myself can draw their conclusions therefrom.

As to the age of the drone, I can add nothing to my last paper, because, with the exception of the few drones reared in the summer of 1856, none were brought forth.

With respect to the age of the worker, I kept a record of the number of bees dying in the hive in the years 1855, 1856, and 1857 ; they were,—

In 1855	.	.	.	.	1442
1856	.	.	.	.	235
1857	.	.	.	.	375

These numbers bear a remarkably small proportion to the number of bees produced, and if we suppose all the others to have been killed, in one way or another, outside the hive, it is a proof of the great dangers to which the worker-bee is exposed in pursuit of the ordinary work of life. The proceedings of the hive, since the publication of the last paper, were little more than a repetition of the former years, and I see no reason to doubt the conclusion therein drawn, that the duration of life in the worker-bee is eight months.

I stocked my Observatory hive on the 22nd June, 1867, with a portion of a swarm, and as the hive had a considerable quantity of comb therein, made in the previous year by a stock which had died, breeding was most rapidly carried on; and as the latter part of the season was very favourable for honey gathering, the hive was well stored with honey sealed over. The hive is still in the old situation, and as the winter of 1867-1868 continued favourable, and the hive showed no appearance of damp or mould, I resolved to let it alone, carefully watching it, to adopt any course which might be found needful under the circumstances. However, I have never once interfered with the hive, and it has passed through the winter without any assistance from me. A few dead bees were occasionally seen at the bottom of the hive, but they were always removed by the bees themselves on the first sunny day.

During the five winters, from 1852 to 1857, the seasons were all so different to the one just past, that, in the one case, the bees could not possibly have lived through December without artificial means being resorted to for their preservation; in the other, they have survived, and have been at all corresponding periods of the year more healthy, and the hive in a much better state. It is impossible, therefore, to lay down any rule for the management of bees in an Observatory hive through the winter; all must depend upon the season, for whilst one course of management may be the means of preserving them during a cold, wet, and severe winter, the same course in a mild and genial winter would be much too exciting, and would lead to their destruction rather than their preservation.

The Observatory hive has been this year more in a natural state than during any former winter through which it has been kept alive, and the queen began to lay her eggs, from which brood has been reared, in the month of February, but no cessation of breeding has this year taken place, so that it would seem that the ceasing to breed at this period of the year was the result of the inclement weather, and was not a natural course of events in the life of the queen.
